**What is Claimed is:**

1. A method of optimizing performance of a bioprocess involving a complex nutrient mixture comprising:

(a) periodically and alternately stopping a supply of each nutrient in a complex nutrient mixture to a culture of microorganisms until a metabolic activity of the microorganisms decreases by a preset percentage;

(b) calculating a new feed concentration of the complex nutrients; and

(c) adjusting the amount of each nutrient supplied to the microorganism with an optimization routine.

2. A method according to claim 1, wherein the optimization routine comprises a co-ordination controller for generating control variables, a multicomponent controller, and means for controlling feed concentrations of the complex nutrients.

3. A method according to claim 1, wherein the complex nutrient mixture comprises two different nutrient mixtures.

4. A method according to claim 1, wherein the optimization routine comprises:

(a) generating a flow chart with a co-ordination controller using a negative-pulse response technique;

(b) generating response times; and

(c) using the response times to form the input variable $Q_{sens}$.

5. A method according to claim 2, wherein the multicomponent controller is a fuzzy-logic controller.

6. A method according to claim 1, wherein a ratio between the feed concentrations of the complex nutrients and the total quantity of the complex nutrients are treated as separate control variables but are adjusted simultaneously.

7. A method according to claim 1, wherein the microorganism is *Gluconobacter suboxydans*.

8. A method according to claim 7, wherein D-sorbitol is converted to L-sorbose.

9. A device for optimized performance of microbiological processes involving complex nutrient mixtures, wherein a supply of each nutrient is periodically and alternately stopped until a metabolic activity of a microorganism in the process decreases by a preset percentage, whereupon new feed concentrations of the complex nutrients are calculated and adjusted with an optimization routine, the device comprising

a) a reactor for performing the microbiological process with a microorganism comprising at least two individual feed lines for supplying nutrients to the reactor;

b) sensors for measuring a metabolic activity of the microorganism;

c) a co-ordination controller controlled by the sensors;

d) a multicomponent controller; and

e) elements for controlling the feed concentrations of the complex nutrients.

10. A method for optimizing production of a fermentation product comprising:

(a) Cultivating in a bioreactor a microorganism in a complex nutrient mixture using a first feed concentration;

(b) retarding the flow of a first nutrient from the mixture into the bioreactor;

(c) measuring a metabolic activity of the microorganism and maintaining the retardation of the flow of the first nutrient into the bioreactor until the metabolic activity of the microorganism decreases by a preset value;

(d) calculating a second feed concentration using an optimization routine;

(e) adjusting the first feed concentration to the second feed concentration based on the calculation in step (d); and

(f) repeating steps (a)-(e) until the nutrient mixture supplied to the microorganism is optimized for the production of the fermentation product.

11. A process according to claim 10 wherein the metabolic activity is determined by a parameter selected from the group consisting of oxygen transfer rate, carbon dioxide transfer rate, pH, concentration of dissolved oxygen in the bioreactor, and the temperature of the bioreactor.

12. A process according to claim 10 wherein the preset value in step (c) is a decrease in the metabolic activity of about 1% to about 5%wt.

13. A process according to claim 10 wherein the optimization routine comprises a co-ordination controller for generating control variables, a multicomponent controller, and a control element for control of flow rate of the nutrients in the complex nutrient mixture into the bioreactor.

14. A process according to claim 13 wherein the multicomponent controller is a fuzzy-logic controller.

15. A process according to claim 10 wherein the complex nutrient mixture comprises at least two different complex nutrient mixtures.

16. A fermentation system wherein cultivation of a microorganism is optimized for production of a fermentation product, the fermentation system comprising:

(a) a bioreactor equipped for continuous operation;

(b) means for separating nutrients of a complex nutrient mixture into separate streams of the individual nutrients, so that the composition of the mixture that is introduced into the bioreactor may be altered during the fermentation process;

(c) means for measuring and controlling pH, $pO_2$, and temperature in the bioreactor;

(d) a device for measuring and controlling the amount of the nutrient mixture introduced into the bioreactor;

(e) means for controlling a feed stream of the nutrient mixture into the bioreactor and for measuring an exhaust-gas composition to provide a gas transfer rate as a measurement signal; and

(f) an automation system for controlling the fermentation system.